



**PARAGON**  
TRADE BRANDS

**HUNTON &  
WILLIAMS**

IN THE

**UNITED STATES  
PATENT AND  
TRADEMARK OFFICE**

**APPLICATION FOR UTILITY  
PATENT**

**ABSORBENT GARMENT TAB HAVING  
ELASTICITY ZONES**

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## ABSORBENT GARMENT TAB HAVING ELASTICITY ZONES

### FIELD OF THE INVENTION

The present invention relates generally to fastening devices for absorbent garments. More specifically, the present invention relates to a fastening device for an absorbent garment having multiple elasticized regions.

### BACKGROUND OF THE INVENTION

5 Traditionally, disposable absorbent garments such as infant diapers or training pants, adult incontinence products and other such products were constructed with a moisture-impervious outer backsheet, a moisture-pervious body-contacting inner topsheet, and a moisture-absorbent core sandwiched between the liner and backsheet. In typical diaper-type garments, the garment is affixed to a wearer by attaching one or  
10 more fastener tabs that extend across the wearer's hips to hold the back and front halves of the garment to one another.

Much effort has been expended to find a desirable design for absorbent garment fastener tabs. The task of designing a universally suitable fastener tab is complicated by the fact that the fasteners are used on a great number of different wearers, all having  
15 slightly to very different body shapes and sizes. Also complicating the design of fastener tabs is the fact that the wearers typically move their bodies while the fasteners are attached, sometimes causing the tabs to become loose, uncomfortable or even unfastened. Yet another factor complicating the task of fastener tab design is the fact that the caregivers applying the tabs do so in a variety of ways that may or may not be  
20 suitable to properly affix tabs of the particular design being applied.

A number of different tab designs have been explored to provide suitable fit, comfort, leakage prevention, and other benefits. Typical fastener tabs are inelastic

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5 plastic tabs having an adhesive or hook-and-loop gripping portion. Such tabs may be  
attached directly to the diaper chassis or may have an elastic region interposed between  
the chassis and the inboard edge of the grip, such as is disclosed, for example, in U.S.  
Patent No. 5,624,429 issued to Long *et al.*, which is incorporated herein by reference in  
its entirety and in a manner consistent with the present invention. Other fastener tabs  
10 have been made that have an elasticized portion that extends all the way to the end of  
the tab, and have the grip attached directly to one side of the elastic portion at the  
outboard end, typically rendering that portion of the fastener tab inelastic. Such tabs  
are disclosed, for example, in U.S. Patent No. 3,800,796 issued to Jacob, which is  
incorporated herein by reference in its entirety and in a manner consistent with the  
15 present invention. Still other fastener tabs have been provided with elasticized regions  
that have intermediate zones, located between the grip and the diaper chassis, having  
little or no elastic stretchability, such as those disclosed, for example, in U.S. Patent No.  
6,132,411 issued to Huber *et al.*, which is incorporated herein by reference in its entirety  
and in a manner consistent with the present invention.

Despite these and other efforts by absorbent garment manufacturers and others  
to provide suitable fastener tabs for absorbent garments, there is still a need to provide  
a more comfortable, better fitting, and easily applied fastener tab. These are just a few  
of the disadvantages of the prior art that the preferred embodiments seek to address.

## SUMMARY OF THE INVENTION

It would be desirable to provide fastener tabs for absorbent garments that  
provide more control over the grip to allow better attachment to the garment. It would  
also be desirable to provide fastener tabs that have selectively elasticized regions that  
provide increased comfort and fit on moving wearers having a variety of body shapes  
25 and sizes.

In accordance with these and other features of various embodiments of the invention, there is provided a fastener tab for an absorbent garment having longitudinally opposite waist regions when laid flat. The fastener tab has a first elastic region for attaching to one of the waist regions of the garment and having a first stretch resistance, a dead zone adjacent to the first elastic region, a second elastic region adjacent to the dead zone and having a second stretch resistance, and a gripping zone attached to the second elastic region. The dead zone has substantially more stretch resistance than the first and second elastic regions, and the first stretch resistance is at least as great as the second stretch resistance.

Other embodiments of the invention provide a fastener tab for an absorbent garment having longitudinally opposite waist regions when laid flat, a longitudinal centerline of the fastener tab being in a direction substantially perpendicular to a longitudinal direction of the garment. The fastener tab has a first elastic region having a first stretch resistance, a dead zone adjacent to the first elastic region, a second elastic region adjacent to the dead zone and having a second stretch resistance at least as great as the first stretch resistance, and a gripping zone attached to one of the first and second elastic regions. The dead zone has substantially more stretch resistance than the first and second elastic regions, the first elastic region is located mostly on a waist side of the longitudinal centerline of the tab, and the second elastic region is located mostly on a leg side of the longitudinal centerline of the tab.

Other embodiments of the invention provide a fastener tab for an absorbent garment having longitudinally opposite waist regions when laid flat. The fastener tab has an elastic region for attaching to the garment, a gripping zone attached to the elastic region, and a dead zone within the elastic region between the gripping zone and the garment. The elastic region has a uniform stretch resistance and a primary stretch direction along which the elastic region is stretched when the tab is used. The dead zone has substantially more stretch resistance than the elastic region.

Other embodiments of the invention provide a fastener tab for an absorbent garment having longitudinally opposite waist regions when laid flat. The fastener tab has a first elastic region for attaching to the garment, a dead zone adjacent to the first elastic region, a second elastic region adjacent to the dead zone, and a gripping zone attached to the second elastic region. The dead zone has substantially more stretch resistance than the elastic region, the elastic region has a primary stretch direction along which the elastic region is stretched when the tab is used, the dead zone extends a first distance in a direction perpendicular to the primary stretch direction, the tab extends a second distance in the direction perpendicular to the primary stretch direction, and at all points along the primary stretch direction the first distance is less than the second distance.

Other embodiments of the invention provide an absorbent garment having longitudinally opposite waist regions when laid flat. The absorbent garment has a chassis, an absorbent core attached to the chassis, and a fastener tab. The fastener tab has a first elastic region attached to one of the waist regions of the garment and having a first stretch resistance, a dead zone adjacent to the first elastic region, a second elastic region adjacent to the dead zone and having a second stretch resistance, and a gripping zone attached to the second elastic region. The dead zone has substantially more stretch resistance than the first and second elastic regions, and the first stretch resistance is at least as great as the second stretch resistance.

These and other features of the invention will be readily apparent from the Detailed Description that follows, along with reference to the drawings appended hereto.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

- 5      Figure 1 is plan view of a garment in accordance with the invention;  
      Figure 2 is a section view along section line II-II in Figure 1;

Figure 3 is a section view along section line III-III in Figure 1;  
Figure 4 is a plan view of a tab in accordance with the invention;  
Figure 5 is a plan view of a tab having no central dead zone;  
Figure 6 is a plan view of the tab shown in Figure 4 in a stretched condition;  
Figure 7 is a plan view of a tab in accordance with the invention;  
Figure 8 is a plan view of the tab shown in Figure 7 in a stretched condition;  
Figure 9 is a plan view of the tab shown in Figure 7 in a stretched condition;  
Figure 10 is a plan view of a tab in accordance with the invention; and  
Figure 11 is a plan view of a tab in accordance with the invention.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

As used herein, the term "absorbent garment" or "garment" refers to garments that absorb and contain exudates, and more specifically, refers to garments that are placed against or in proximity to the body of the wearer to absorb and contain the various exudates discharged from the body. A non-exhaustive list of examples of absorbent garments includes diapers, diaper covers, disposable diapers, training pants, feminine hygiene products and adult incontinence products. The term garment includes all variations of absorbent garments, including disposable absorbent garments that are intended to be discarded or partially discarded after a single use (i.e., they are not intended to be laundered or otherwise restored or reused) and unitary disposable absorbent garments that have essentially a single structure (i.e., do not require separate manipulative parts such as a diaper cover and insert). As used herein, the term "diaper" refers to an absorbent garment generally worn by infants and incontinent persons about the lower torso.

The invention is intended to cover all of the foregoing classes of absorbent garments, without limitation, whether disposable, unitary or otherwise. These classifications are used interchangeably throughout the specification, but are not

intended to limit the invention. The invention will be understood to encompass, without limitation, all classes of absorbent garments, including those described above.

Absorbent garments and diapers may have a number of different constructions. In each of these constructions it is generally the case that an absorbent core is disposed  
5 between a liquid pervious, body-facing topsheet, and a liquid impervious, exterior facing backsheet. In some cases, one or both of the topsheet and backsheet may be shaped to form a pant-like garment. In other cases, the topsheet, backsheet and absorbent core may be formed as a discrete assembly that is placed on a main chassis layer and the chassis layer is shaped to form a pant-like garment. The garment may be  
10 provided to the consumer in the fully assembled pant-like shape, or may be partially pant-like and require the consumer to take the final steps necessary to form the final pant-like shape, such as by fastening one or more fastener tabs. In the case of training pant-type garments and most adult incontinent products, the garment often is provided fully formed with factory-made side seams and the garment is donned by pulling it up  
15 the wearer's legs. In the case of diapers, a caregiver usually wraps the diaper around the wearer's waist and joins the side seams manually by attaching one or more fastener tabs, thereby forming a pant-like structure. For clarity, the present invention is described herein only with reference to a diaper-type garment in which the topsheet, backsheet and absorbent core are assembled into a structure that forms a pant-like  
20 garment when secured on a wearer using fastening devices, although the invention may be used with any other type of absorbent garment that may benefit from the use or addition of fastener tabs.

A preferred embodiment of the present invention comprises a disposable absorbent garment 10 of the diaper type, such as shown, for example, in Figure 1. With  
25 reference to Figure 1, a diaper 10 according to a preferred embodiment is shown in a relaxed condition with the effects of the elastics removed for purposes of clarity in the description. The diaper 10 chassis generally has an hourglass shape. The chassis

generally can be defined in terms of a front waist region 22, a back waist region 24, and a crotch region 26. Those skilled in the art will recognize that "front" and "back" are relative terms, and these regions may be transposed without departing from the scope of the present invention. Alternatively, the diaper chassis can be configured in a generally rectangular shape or in a "T" shape. The diaper preferably comprises a topsheet 2, a backsheet 4, which may be substantially coterminous with the topsheet 2, and an absorbent core 6 disposed between at least a portion of the topsheet 2 and backsheet 4. Throughout this description, the terms "topsheet" and "backsheet" denote the relationship of these materials or layers with respect to the absorbent core 6. It is understood that additional layers may be present between the absorbent core 6 and the topsheet 2 and backsheet 4, and that additional layers and other materials may be present on the side opposite the absorbent core 6 from either the topsheet 2 or the backsheet 4. A pair of leg openings 28a, 28b extend along at least a portion of the crotch region 26 and one or more pairs of leg elastics 8 (three pairs are shown in Figure 1) may be disposed to extend adjacent to leg openings 28a, 28b. Of course, in other embodiments, the leg elastics 8 may be omitted altogether.

The diaper 10 generally has a longitudinal direction 100 that extends generally parallel to the front-to-back axis of a wearer, and a lateral direction 102 that extends generally parallel to the side-to-side axis of a wearer. The diaper generally is symmetrical about a longitudinal centerline 60, but also may have asymmetrical components or shapes. The terms "inboard" and "outboard," as used herein, refer to positions generally along the lateral direction 102, with "inboard" locations being located closer to the longitudinal centerline 60 than "outboard" locations. "Outward" and "inward" mean in an outboard or inboard direction, respectively.

The diaper may further include a front waist elastic system 30a, a back waist elastic system 30b, and a waste containment system in the form of waste containment flaps 12 (also known as unitary leg gathers or standing leg gathers). Waste containment



flaps 12 (Figure 2) preferably extend from the front waist region 22 to the back waist region 24 along opposite sides of the longitudinal center line 60 of the diaper 10, or alternatively only along a portion thereof. The front waist region 22 and rear waist region 24 preferably include ear portions 38, 40 extending outward from the leg openings 28a, 28b to provide the garment 10 with an hourglass shape.

A variety of backsheet and topsheet constructions and materials are available and known in the art, and the invention is not intended to be limited to any specific materials or constructions of these components. The backsheet 4 may be made from any suitable pliable liquid-impervious material known in the art. Typical backsheet materials include films of polyethylene, polypropylene, polyester, nylon, and polyvinyl chloride and blends of these materials. For example, the backsheet can be comprised of a pigmented polyethylene film having a thickness in the range of 0.02-0.04 mm. The moisture-pervious topsheet 2 can be made of any suitable relatively liquid-pervious material known in the art that permits passage of liquid therethrough. Non-woven topsheet materials are exemplary because such materials readily allow the passage of liquids to the underlying absorbent core 6. Examples of suitable topsheet materials include non-woven spunbond or carded webs of polypropylene, polyethylene, nylon, polyester and blends of these materials.

The backsheet 4 and the topsheet 2 preferably are "associated" with one another. The term "associated" encompasses configurations whereby the topsheet 2 is directly joined to the backsheet 4 by affixing the topsheet 2 directly to the backsheet 4, and configurations whereby the topsheet 2 is indirectly joined to the backsheet 4 by affixing the topsheet 2 to intermediate members which in turn are affixed to the backsheet 4. While the backsheet 4 and topsheet 2 in the preferred embodiment have substantially the same dimensions, they may also have different dimensions.

In addition, the backsheet 4 may be covered with a fibrous, nonwoven fabric layer (not shown) such as is disclosed, for example, in U.S. Patent No. 4,646,362, which

is incorporated herein by reference in its entirety and in a manner consistent with the present invention. Materials for such a fibrous outer liner include a spun-bonded nonwoven web of synthetic fibers such as polypropylene, polyethylene or polyester fibers; a nonwoven web of cellulosic fibers, textile fibers such as rayon fibers, cotton and the like, or a blend of cellulosic and textile fibers; a spun-bonded nonwoven web of synthetic fibers such as polypropylene; polyethylene or polyester fibers mixed with cellulosic, pulp fibers, or textile fibers; or melt blown thermoplastic fibers, such as macro fibers or micro fibers of polypropylene, polyethylene, polyester or other thermoplastic materials or mixtures of such thermoplastic macro fibers or micro fibers with cellulosic, pulp or textile fibers.

The backsheet 4 may comprise multiple panels, such as three panels wherein a central poly backsheet panel is positioned adjacent the absorbent core while outboard non-woven breathable side backsheet panels are attached to the side edges of the central poly backsheet panel. The backsheet may also be formed from microporous poly coverstock for added breathability. In other embodiments, the backsheet may be a laminate of several sheets. The backsheet may further be treated to render it hydrophilic or hydrophobic, and may have one or more visual indicators associated with it, such as labels indicating the front or back of the diaper or other characters or colorations. The present invention is not limited to any particular backsheet 4 material or construction.

The topsheet 2 may be formed from one or more panels of material and may comprise a laminated sheet construction. In the embodiment of Figures 1 and 2, the topsheet comprises three separate portions or panels. A three-panel topsheet may comprise a central topsheet panel 2a that preferably is formed from a liquid-pervious material that is either hydrophobic or hydrophilic. The central topsheet panel 2a may be made from any number of materials, including synthetic fibers (e.g., polypropylene or polyester fibers), natural fibers (e.g., wood or cellulose), apertured plastic films,

reticulated foams and porous foams to name a few. One preferred material for a central topsheet panel 2a is a cover stock of single ply non-woven material which may be made of carded fibers, either adhesively or thermally bonded, perforated plastic film, spunbonded fibers, or water entangled fibers, which generally weigh from 0.3-0.7 oz./yd<sup>2</sup> and have appropriate and effective machine direction and cross-machine direction strength suitable for use as a baby diaper cover stock material, as are known in the art. The central topsheet panel 2a preferably extends from substantially the front waist region 22 to the back waist region 24 or a portion thereof.

The second and third topsheet panels 2b, 2c in this embodiment may be positioned laterally outside of the central topsheet panel 2a. The outer topsheet panels 2b, 2c are preferably substantially liquid-impervious and hydrophobic, preferably at least in the crotch area. The outer edges of the outer topsheet panels may substantially follow the corresponding outer perimeter of the backsheet 4. The material for the outer topsheet portions or panels is preferably polypropylene and can be woven, non-woven, spunbonded, carded or the like, depending on the application.

An inner region 34 (Figure 2) of the outer topsheet portions or panels 2b, 2c preferably are attached by, e.g., an adhesive, to the outer edges 36 of the inner topsheet portion or panel 2a. At the point of connection with the outer edges 36 of the inner topsheet portion or panel 2a, the inner regions 34 of the outer topsheet portions or panels 2b, 2c extend upwardly to form waste containment flaps 12. The waste containment flaps 12 may be formed of the same material as the outer topsheet portions or panels 2b, 2c, as in the embodiment shown. The waste containment flaps 12 may also be formed from separate elasticized strips of material that are associated with the topsheet, backsheet or both, or otherwise integrated into the garment.

The waste containment flaps 12 may be treated with a suitable surfactant to modify their hydrophobicity/hydrophilicity or imbued with skin wellness products as desired. The central topsheet portion or panel 2a may extend past the connection point

with the waste containment flaps 12 and even extend to the periphery of the backsheet. Still further, the central topsheet portion or panel 2a could extend fully between the outer topsheet portions or panels 2b, 2c, and even beyond, so that the outer edges 36 of the central topsheet portion or panel 2a are coextensive with and sandwiched between the outer topsheet portions or panels 2b, 2c and the backsheet 4.

Each waste containment flap 12 preferably includes a portion that folds over onto itself to form an enclosure. One or more elastic members 14 (Figure 2) may be secured in the enclosure in a stretched condition. As has been known at least as long as the disclosure of Tetsujiro, Japanese Patent document 40-11543, when the flap elastic 14 attempts to assume the relaxed, unstretched condition, the waste containment flaps 12 rise above the surface of the central topsheet portion or panel 2a. Various other configurations of topsheets 2 and waste containment systems, such as flaps 12, are known in the art, and the present invention is not intended to be limited to any particular design for these components.

The waist elastics 30a, 30b may be similar or different structures to impart similar or different elastic characteristics to the front and back waist portions 22, 24 of the diaper. In general, the waist elastics may comprise elastically extensible foam strips positioned at the front and back waist sections 22, 24. The foam strips preferably are about 0.50 inches to about 1.50 inches wide and about 3 inches to about 6 inches long. The foam strips preferably are positioned between the topsheet portions or panels and the backsheet 4. Alternatively, a plurality of elastic strands may be employed as waist elastics rather than foam strips. The foam strips preferably are polyurethane, but could be any other suitable material that preferably decreases waist band roll over, reduces leakage from the waist ends of the absorbent garment, and generally improves comfort and fit. The front and back waist foam strips 30a, 30b preferably are stretched to about 150% to about 250% of their unstretched length (in the lateral direction 102), and preferably to about 200% of their unstretched length, before being adhesively secured

between the backsheet 4 and topsheet 2. Waist elastics are known in the art, and the present invention is not limited to the use of a particular waist elastic system, or to the inclusion of waist elastics at all.

Each leg opening 28a, 28b may be provided with a leg elastic containment system 8, sometimes referred to as conventional leg gathers. In a preferred embodiment, three strands of elastic threads are positioned to extend adjacent each leg openings 28a, 28b between the outer topsheet portions or panels 2b, 2c and the backsheet 4. The selection of appropriate elastics and the construction of leg elastic containment systems is known in the art. For example, the leg elastics 8 may be ultrasonically bonded, heat/pressure sealed using a variety of bonding patterns, or glued to the diaper 10.

Various commercially available materials may be used for the leg elastics 8 and elastic members 14, such as natural rubber, butyl rubber or other synthetic rubber, urethane, elastomeric materials such as spandex, which is marketed under various names, including LYCRA (DuPont), GLOSPAN (Globe) and SYSTEM 7000 (Fulflex), and so on. The present invention is not limited to any particular elastic material or to any particular shape, size or number of elastics.

The underlying structure beneath the topsheet 2 may include, depending on the diaper construction, various combinations of elements, but in each embodiment, it is contemplated that the absorbent garment preferably will include an absorbent core 6. Although the absorbent core 6 depicted in Figure 1 has a substantially rectangular shape as viewed in the plan view, other shapes may be used, such as a "T" shape or an hourglass shape. The absorbent core 6 may extend into either or both of the front and back waist regions 24, 22. The shape and construction of the absorbent core 6 may be selected to provide the greatest absorbency in target areas where body fluids are most likely to strike the diaper 10, which is often referred to as zoned absorbency. The absorbent core 6 may also comprise a number of layers of similar or different construction. The absorbent core may be associated with the topsheet 2, backsheet 4, or

any other suitable part of the garment 10 by any method known in the art, in order to fix the absorbent core 6 in place.

Generally, in a preferred embodiment, the absorbent core 6 comprises particles of superabsorbent material (SAP) distributed within a fibrous structure. Additional  
5 fibrous or particulate additives may be disposed within the absorbent core 6 to add to the core's strength and SAP efficiency or to otherwise enhance the performance of the garment. The absorbent core 6 may be partially or wholly surrounded by a tissue layer 16, 18, and other additional layers 20 may be added to provide further benefits. For  
10 example, an additional layer 20 may be disposed between the topsheet 2 and absorbent core 6, as shown in Figure 2, and/or other additional layers may be disposed between these layers, or between absorbent core 6 and backsheet 4. The additional layer 20 or layers may comprise any useful layer known in the art or developed hereafter, such as a fluid acquisition layer, a distribution layer, an additional fibrous layer optionally  
15 containing superabsorbent particles (SAP), a wicking layer, a storage layer, or combinations and fragments of these layers. Such layers may be provided to assist with transferring fluids to the absorbent core 6, handling fluid surges, preventing rewet, containing absorbent material, improving core stability, or for other purposes. Skilled artisans are familiar with the various additional layers that may be included in absorbent articles, and the present invention is not intended to be limited to any  
20 particular type of materials used for those layers. Rather, the invention encompasses all types of wicking layers, all types of distribution layers, etc., to the extent that type of layer 20 is utilized.

The dimensions of the additional layer(s) 20 may be the same as or different from the dimensions of the absorbent core 6 and/or topsheet 2 and backsheet 4. It may be  
25 desirable to make the additional layers 20 smaller than the absorbent core 6 and located only where they are most needed, as such additional layers 20 may be relatively expensive.

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The absorbent core 6 may be made from any absorbent material or materials, or combinations of such materials, known in the art or hereafter discovered. In one embodiment of the invention, the absorbent core 16 comprises wood fibers or other fibers such as chemical wood pulp, fibrous absorbent gelling material, or any other  
5 suitable liquid absorbing material, such as commercially available fluff pulp or fluffed bleached kraft softwood pulp or fibrous absorbent gelling material. In another embodiment of the invention, the absorbent core 6 comprises a combination of a porous fibrous web and superabsorbent particles. Absorbent cores are known in the art and exemplary cores are disclosed, for example, in U.S. Patent No. 5,281,207 issued to  
10 Chmielewski *et al.*, U.S. Patent No. 4,610,678 issued to Weisman *et. al.*, U.S. Patent No. 5,137,537 issued to Herron *et. al.*, U.S. Patent No. 5,147,345 issued to Young *et. al.*, U.S. Patent No. 6,068,620 issued to Chmielewski, and U.S. Statutory Invention Registration No. H1,565, all of which are incorporated herein by reference in their entirety, and in a manner consistent with the present invention.

15 Preferably, the absorbent core is thin in order to improve the comfort and appearance of a garment.

The absorbent core 6 preferably comprises a tissue wrapping that at least partially encloses the fibrous structure and SAP, such as disclosed in U.S. Patent No. 6,068,620. The tissue wrapping is useful, for example, for containing the SAP within the  
20 absorbent core 6 and providing strength to the core during manufacturing and use. In a preferred embodiment, the tissue wrapping comprises first and second tissue layers 16, 18 that encase the absorbent core 6, and may optionally also encase one or more additional layers 20. Preferably, the first tissue layer 16 is located generally between the topsheet 2 and the absorbent core 6, and is hydrophilic and fluid pervious. It is also  
25 preferred that the second tissue layer 18 be located between the backsheet 4 and the absorbent core 6 and be hydrophobic and fluid impervious. The tissue wrapping may also comprise a single tissue layer that has been folded to encase the absorbent core,

and that may be zone treated to render the portion that forms the lower tissue layer 18 hydrophobic and fluid impervious. The tissue layers 16, 18 or the whole core 6 may be crimped, folded, sealed or bonded to further help contain the fibrous structure and SAP particles.

5       The diaper 10 is fastened onto a wearer by using one or more, and preferably two, fastener tabs 32. The fastener tabs 32 preferably are affixed to the chassis of the diaper 10 to extend laterally outward (*i.e.*, in the lateral direction 102) from a waist region 22, 24 of the garment. The fastener tabs 32 preferably are positioned to extend outward from the ear portions 40 of the rear waist region 24, but the fastener tabs 32  
10       may also be attached to extend outward from the front waist region 22, or from both waist regions. The fastener tabs 32 may extend from one, but preferably both, lateral sides of the diaper 10. The fastener tabs 32 may be attached to any part of the diaper chassis, such as the topsheet 2, backsheet 4, outer covering or other layer of the diaper. The fastener tabs 32 may also be attached to either side of the diaper's chassis, to  
15       multiple layers of the chassis, or may be sandwiched between the various sheets comprising the chassis of the diaper 10. Variations on the number, location, and attachment configuration of the fastener tabs 32 will be apparent to those skilled in the art based on the teachings herein, and all such variations are within the scope of the present invention.

20       The fastener tabs 32 may comprise any structure that is elastically extensible, and may have similar or dissimilar constructions, provided they may be joined to the diaper 10. The terms "elastic," "elastically extensible," and variations of these terms as used herein, are understood by those skilled in the art, and generally refer to the ability of a material or combination of materials (such as an aggregate or laminate), to be extended  
25       and retracted with little or no plastic deformation, yielding or rupturing (except as explained elsewhere) of the various parts of the material or combination of materials. The term "inelastic" and variations thereof as used herein, are understood by those



skilled in the art, and generally refer to the substantial absence of elastic properties. Other meanings of these terms will be clear to those skilled in the art of absorbent garment construction.

In a preferred embodiment, the fastener tabs 32 comprise elastic laminates having one or more elastic layers bonded to one another or to one or more inelastic layers. A preferred elastic laminate comprises an elastic layer disposed between a pair of inelastic layers. The elastic layer preferably comprises a styrene based elastic film, such as those disclosed in U.S. Patent No. 6,313,372 issued to Suzuki, which is incorporated herein by reference in its entirety and in a manner consistent with the present invention, however the elastic may also be another type of elastic film, a multidirectional elastic aggregate such as elastic webbing, netting, or scrim elastic, foam, strands or bands of suitable elastic materials, such as natural or synthetic rubber, urethane elastomers, spandex, LYCRA and elastic polymers. Other suitable elastics will be apparent to those skilled in the art in light of the present teachings. The elastic layer for an elastic laminate typically is stretched then affixed between a pair of inelastic layers, which then contract when the elastic layer contracts. In some cases, however, the elastic layer may be affixed between the inelastic layers while in a relaxed state, such as when the elastic layer is a heat-activated material that elastically contracts after being heated. The inelastic outer layers preferably comprise a nonwoven material, such as a spunbonded polypropylene or polyethylene nonwoven similar to those used for the topsheet 2, but may also be any suitable material that encases the elastic layer, protects the elastic layer, allows slideable contact between parts of the diaper 10, or prevents such sliding, protects the wearer from uncomfortable exposure to the elastic layer or provides other benefits. Other uses for the outer layer or layers will be apparent to those skilled in the art based on the teachings herein. In a preferred embodiment, the fastener tabs 32 are breathable to provide additional comfort to the wearer, *i.e.*, the fastener tabs 32 have a moisture vapor transmission rate (MVTR) of at least 250 grams/(m<sup>2</sup> 24 hours), and more preferably an MVTR of about 750

grams/(m<sup>2</sup> 24 hours), and most preferably an MVTR of about 1500 grams/(m<sup>2</sup> 24 hours). The measurement of moisture vapor transmission rate is explained in U.S. Patent No. 5,879,34 to Odorzynski, which is incorporated by reference herein in its entirety and in a manner consistent with the present invention. Preferred elastic  
5 laminates that are suitable for use with the present invention are FABRIFLEX 204 and FABRIFLEX 304 available from Tredegar Film Products of Richmond, Virginia.

The bonding between the various layers of a preferred elastic laminate preferably is accomplished using a number of heat bonds or ultrasonic bonds, but may also be accomplished using adhesives, combinations of different bonding methods, or any  
10 other joining method known in the art or later developed. The construction of such elastic laminates is known in the art, and a skilled artisan will be able to provide a suitable elastic laminate or other elastic design for the fastener tabs 32 without undue experimentation, based on the teachings provided herein.

The fastener tabs 32 may also be a "zero strain" stretch-laminate, which generally  
15 is manufactured by attaching a sheet of elastic to outer layers while the elastic is in a relaxed state, then "activating" the laminate by extending the elastic to create plastic deformation, yielding or rupturing in the outer layers. After the initial activation, the zero-strain stretch laminate behaves generally like any other elastic laminate. Such elastics are disclosed, for example, in U.S. Patent No. 5,464,401 issued to Hasse *et al.*,  
20 and U.S. Patent No. 6,313,372 issued to Suzuki, which are incorporated herein by reference in their entirety and in a manner consistent with the present invention. One or both of the elastic regions 302, 306 may also comprise sheets, ribbons, scrims, strands, foams or other types of elastic material that may or may not be secured between outer sheets. Still another material that may be used for one or both of the elastic regions 302,  
25 306 is a coextruded sheet of elastic and inelastic polymers, such as is disclosed, for example, in U.S. Patent No. 4,787,897 issued to Torimae *et al.*, which is incorporated herein by reference in its entirety and in a manner consistent with the present invention.

The fastener tabs 32 may be joined to the diaper chassis by any method known in the art. Exemplary joining methods include, but are not limited to, ultrasonic bonding, heat bonding, adhesive bonding, chemical bonding, and so on. Of these, heat bonding, ultrasonic bonding and adhesive bonding, and combinations of these bonding methods are preferred. Additional substrate layers may also be added to the fastener tabs 32 to facilitate their bonding with the diaper chassis.

The fastener tabs 32 of the present invention are elasticized and have zones of reduced elasticity. The zones of reduced elasticity are referred to herein as dead zones. The dead zones can have essentially no elasticity or can have elasticity such that the stretch resistance of the dead zones is greater than the stretch resistance of the chassis of the tab. Some examples of ways to make the dead zones are discussed in U.S. Patent No. 6,069,097 to Suzuki et al.

Figure 3 shows a cross section of tab 32 along section line III-III in Figure 1. Figure 4 shows the example of tab 32 shown in Figures 1 and 2 in plan view. Tab 32 has a tab chassis 110 that is preferably made of an elastic material. A gripping zone 130 is located at or near an edge of tab 32 that is farthest from the garment. Gripping zone 130 is shown in this example as having a fastener 120 such as, for example, one half of a hook and loop fastener. In this example, gripping zone 130 is also a dead zone. However, gripping zone 130 could be any portion of tab 32. Dead zone 132 is shown in the central region of tab 32. The utility of placing dead zone 132 in the central region of tab 32 will be discussed below. This example of tab 32 is shown as having a dead zone 134 adjacent the garment. Dead zone 134 is optional and may be omitted in some embodiments of the invention. The tab chassis 110 can have a uniform stretch resistance or it can have a different stretch resistance in different areas of tab chassis 110. For example, the portion of tab chassis 110 to the left of dead zone 132 in Figure 4 could have more or less stretch resistance than the portion of tab chassis to the right of dead zone 123.

Figure 5 shows a tab 90 having an elastic chassis 95, a gripping zone 96, and a fastener 97. When tab 90 is elongated by pulling (to the left in Figure 5) on gripping zone 96, elastic chassis 95 tends to neck-down in the central portion of chassis 95. This necking-down phenomenon causes buckling and bunching in the central portion of chassis 95 which can result in an unsightly tab that will not lay flat against the garment when used. In addition, a necked-down tab results in a thinner tab at the side of the user that can produce an uncomfortable pressure over a small area.

The example of the invention shown in Figures 3, 4 and 6 helps reduce undesirable necking-down by providing dead zone 132 in the central region of tab 32. As shown in Figure 6, when tab 32 is stretched, dead zone 132 prevents chassis 110 from necking-down in the central region of chassis 110. Some necking-down may still occur in other regions of tab 32, but for a given amount of stretch, the addition of dead zone 132 results in a smaller necking depth and, therefore, a larger minimum width in a transverse direction of tab 32. This, in turn, results in a more comfortable tab 32 due to a more distributed pressure at the side of the user.

Figures 7-9 show another example of a tab 32 in accordance with the invention. In Figure 7, tab 32 is shown as having a diagonally mounted dead zone 136 which divides a central region of chassis 110 into a waist portion 111 and a leg portion 112. Waist portion 111 and leg portion 112 are so named because of their relative proximity to the waist and the leg of the user. The embodiment shown in Figures 7-9 provides reduced necking-down as discussed above while also providing the ability to apply more elastic force in either the waist region of the garment or the leg region of the garment. Figure 8 shows tab 32 being stretched more at the top (waist region) of tab 32 than at the bottom (leg region). During this type of stretching, dead zone 136 helps reduce necking-down in waist portion 111 as compared to a tab with no dead zone. Similarly, Figure 9 shows reduced necking-down in leg portion 112 when tab 32 is stretched more at the bottom than at the top. Although dead zone 136 is shown as

being diagonally positioned from top right to bottom left in the figures, it is noted that dead zone 136 could alternatively be positioned diagonally from top left to bottom right. In addition, although dead zone 136 is shown as continuing to the edges of chassis 110, it is noted that dead zone 136 could stop short of the edges of chassis 110.

5        Figure 10 shows an embodiment of the invention having two dead zones 138, 140 positioned at the edges of chassis 110. While this embodiment may not prevent as much less necking-down as the embodiment shown in Figures 3, 4 and 6, it does provide an improvement over a tab with no dead zones and may be less restrictive to the elasticity of tab 32 as a whole.

10        Figure 11 shows an example of the invention having a dead zone 142 that has curved edges. Other examples of dead zones have only one curved edge. Either one, or both, of the curved edges can be concave toward the diaper, convex toward the diaper, or a combination of both. One edge can be concave toward the diaper while the other edge is convex toward the diaper. Further, straight sections can be combined with  
15        curved sections to form the edge.

Other embodiments, uses, and advantages of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. The specification should be considered exemplary only, and the scope of the invention is accordingly intended to be limited only by the following  
20        claims and equivalents thereof.